

>> To produce 87.5 grams of carbon dioxide, how many grams of acetylene must we use? Okay now what we're looking at in this equation is the combustion of acetylene with oxygen to form water and carbon dioxide. We're starting with a certain amount of carbon dioxide, or at least we're saying we want to make this many grams of carbon dioxide. Now, working backwards, how many grams of starting material must we use? This is going to be one, two, a three-step process, because when we compare to items in an equation like this, we have to compare the moles of one to the moles of the other. So we have to change this from grams to moles using the molar mass of carbon dioxide. Over here once we get the moles of acetylene, we have to change it to grams using the molar mass of acetylene. To get from moles of carbon dioxide to moles of acetylene, we have to use our molar ratio or our mole ratio. Okay, so let's do it one step at a time. 87.5 grams of carbon dioxide. Now we're taking the molar mass and flipping it over so that we can cancel out grams of carbon dioxide. And we have the 87.5 divided by 44.01 grams, which is the molar mass of carbon dioxide, gives us 1.99 moles of CO₂. Now we're really to go ahead and do this step using our molar ratio of two moles of acetylene for every four moles of CO₂. So we have our 1.99 moles of CO₂, times two moles of acetylene divided by four moles of CO₂. Okay, or per every four moles of CO₂. Now, we're going to be able to go ahead and cancel those, we have 1.99 times 2 divided by 4, gives us now 0.995 moles of acetylene, which is the only units left there that aren't canceled. Last step, now we've got this here, we want to go to grams. 0.995 moles of acetylene times the molar mass of acetylene, which is 26.036 grams per mole. We know, once again, we're going to cancel out moles, this time it's moles of acetylene, ending with grams of acetylene. So the 0.995 times 26.036 will give us 25.9 grams of acetylene. Looking back, you can see we started with three significant figures, we're going to make sure we end with three significant figures in our answer.